

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Hikaru OKUBO, Nobuki TANAKA and
Itaru WATANABE

Serial No.: 10/593,137

Filed: March 16, 2005

For: RESIN COMPOSITION AND SEMICONDUCTOR DEVICE
PRODUCED BY USING THE SAME

DECLARATION UNDER 37 CFR 1.132

Honorable Commissioner of Patents and Trademarks,
P. O. Box 1450, Alexandria, VA 22313-1450

Sirs:

I, Ryuichi MURAYAMA, a Japanese citizen, residing at c/o SUMITOMO BAKELITE Co., Ltd. 5-8 Higashishinagawa 2-chome, Shinagawa-ku, Tokyo, 140-0002 Japan, hereby declare and state that I graduated from Nihon University, Department of Industrial Chemistry, College of Science and Technology in 1990, and I also declare that I have been employed by SUMITOMO BAKELITE Co., Ltd. since 1990, and I now engage in Electronic Device Materials Research Laboratory I.

I declare that I have read all of the documents concerning the above entitled patent application and am familiar with the contents of the present invention in this application.

I further declare that the following experiments were conducted by myself and that the results of the experiments are all true and correct to the best of my own knowledge.

[Experiments]

In order to more clearly demonstrate the advantageous effects of the present invention shown in Table 1 of the specification of the present invention, I hereby submit additional reference examples A1', A1'' and A1'''.

The additional reference examples A1', A1'' and A1''' are conducted in the same manner as the Example Series A described in the specification of the present invention. In particular, resin compositions having the compositions shown in the following table were prepared in the same manner as Example A1 of the Example Series A, except that the below-described compound 1', compound 1'' or compound 1''' was used in place of the compound 1. The resin compositions were evaluated in the same method as Example Series A. The results of the experiments are shown in the table below, along with Examples A1 to A4

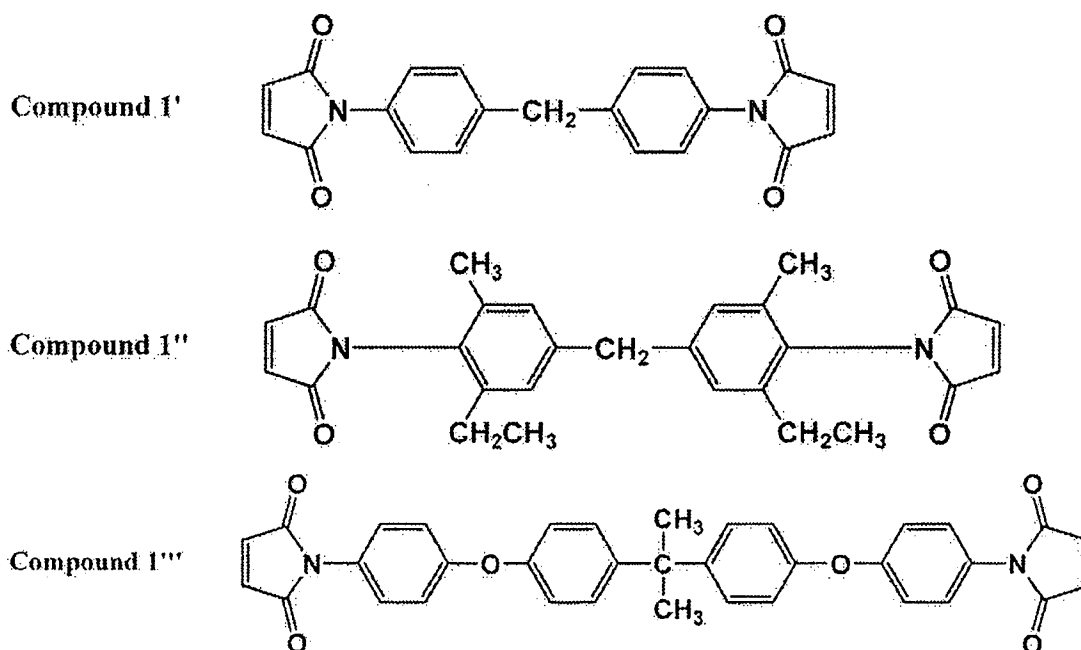
described in the specification of the present invention.

The compound 1' corresponds to a bismaleimide that is described in Herr et al., in which X has a structure represented by the formula (1) and $Q=CH_2-$. Also, the compound 1' is N,N-(4,4'-diphenylmethane) bismaleimide that is exemplified in paragraph [0049] of Sakurai et al. as the polyfunctional aromatic maleimide (B-4).

The compound 1'' corresponds to a bismaleimide described in Herr et al., in which $Q=Ph(Me)(Et)-CH_2-Ph(Me)(Et)-$. Also, the compound 1'' is encompassed in the polyfunctional aromatic maleimide (B-4) of Sakurai et al.

The compound 1''' corresponds to a bismaleimide described in Herr et al., in which X has a structure represented by the formula (I) and $Q=O-Ph-C(Me)(Me)-Ph-O-$. Also, the compound 1''' is encompassed in the polyfunctional aromatic maleimide (B-4) of Sakurai et al.

Compared to the resin compositions of the additional reference examples A1' to A1''' comprising, in place of the compound (B') of the present invention, the compounds 1' to 1''' which are encompassed in the maleimide compounds described in the cited references (Herr et al. and Sakurai et al.) and do not correspond to the compound (B') of the present invention, the resin compositions A1 to A4 of the present invention were proved to have a low viscosity, a small decrease in the adhesion after a PCT and a high solder crack resistance.

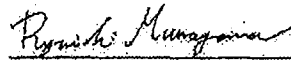


Tabel 1

			Example				Reference example		
			A1	A2	A3	A4	A1'	A1''	A1'''
Compound 1			7.8	9.7	7.8	7.8			
Compound 1'							7.8		
Compound 1''								7.8	
Compound 1'''								7.8	
Compound 2						11.7			
Compound 3			11.7	9.7	9.7		11.7	11.7	
Compound 4									
Diluent					1.9				
Initiator			0.4	0.4	0.4	0.4	0.4	0.4	
Silver powder			80.0	80.0	80.0	80.0	80.0	80.0	
Methacryl silane			0.2	0.2	0.2	0.2	0.2	0.2	
Viscosity	Initial value (Pa·s)		18.4	20.4	16.4	17.8	42.4	45.2	45.8
	After 48 hours (Pa·s)		18.6	20.8	16.8	17.2	44.2	46.3	47.8
	Viscosity increasing rate		1%	2%	2%	3%	4%	4%	4%
Adhesion strength (N/chip)	30 seconds curing (hot plate)	After curing	45	45	41	54	60	55	54
		After PCT	35	40	32	44	14	12	12
	60 minutes curing (oven)	After curing	50	52	48	50	44	42	44
		After PCT	34	38	33	34	10	12	9
Solder crack resistance	Delaminated area (%)		<10	<10	<10	<10	90	90	90
Comprehensive evaluation			○	○	○	○	×	×	×

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated this 16th day of November, 2010



Ryuichi MURAYAMA